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EXTRACTION OF SURFACE WATER BODIES FROM LANDSAT 8 OF PRAKASAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

Surface water bodies are the major source for irrigation in India. Information on surface water bodies such as water spread area, volume of water stored in a water body is useful for understanding the availability of water resources for the crop season in a river basin / sub basin. Satellite based techniques provide the surface water sprayed at spatial and temporal scale and also facilitate mapping, monitoring visualization of the dynamics unlike conventional methods. Hence, the dynamics of surface water bodies in Prakasam district are studied through geospatial analysis for the extraction of water body layers for the month of October, 2015 and 30 Oct, 2015. Geospatial database on water bodies information has been created from the Landsat 8 image of path/row 143/49 (LC81430492015294LGN00. tar, LC81420492015303LGN01. tar) The water bodies where water is stored for irrigation purpose such as reservoirs, tanks and ponds are taken into consideration excluding rivers. ERDAS Imagine and Arc GIS software was used for extracting spatio- temporal water body layers in the study area. The model was used for the estimation of the water spread area were NIR-RED (Band 5-Band 4). Quantitative estimates of water spread area (WSA) of water bodies are obtained from analyzing inter / intra seasonal / annual analysis. The WSA calculated for each is 4178.48ha. The present study has brought out geospatial database on WSA and provided scope for sub regional / regional analysis. The information can be used in deciding the cropping pattern in the study area.

KEYWORDS: Water Spread Area, Surface Water Bodies, Remote sensing and GIS

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Original Article

INTRODUCTION

Water resource is one of the most important aspect in the world almost 97 % of water in the sea, which was salt and 3% fresh which was available on the surface and ground, from this fresh water is used for the Agricultural purpose, Industrial purpose and Domestic purposes. India was an agricultural based country so most of the water was supplied for the crop production, but most of the water was wasted because of lack of knowledge on water requirements, lack water manager/ water user. The information on water resource and the water availability of surface is one of the most important activities to know the temporal availability of the water storage bodies monitoring for this mapping of natural resources water bodies using satellite imagery has gained much importance in the recent past. This information was demonstrated through remote sensing as give the quick and temporal information on surface water bodies. The remote sensing data were downloaded from public domain (www.usgs.gov) for free downloadable data on daily bases. This paper presents an approach to extract the water body from a Landsat 8 satellite imagery using a simple model developed for the extraction of water bodies. The feature vector in this study is a set of characteristic properties shown by a pixel of the water body. The model was carried out by the difference of near infrared and red (NIR-RED).

MATERIALS AND METHODS

Study Area

Prakasam is one of the largest districts among the coastal districts of Andhra Pradesh with an area of 17626 km^2 and an average rainfall was 616 mm. This district lies between 14^0 50' 27.725" to 16^0 17' 21.168" North latitude and 78^0 31' 1.298" to 8^0 30' 22.62" East longitude. The average elevation is 10m (30ft). It has a population of above 3054940 as per 2001 census. It is bounded on the north by Guntur and Mahaboobnagar Districts on the south by Kadapa and Nellore Districts, on the east by the Bay of Bengal and on the west by Kurnool Districts. The district headquarters is located at Ongole. Many areas in this district depend on ground water for drinking and other purposes. The Map of the study area is shown in the following figure 1.

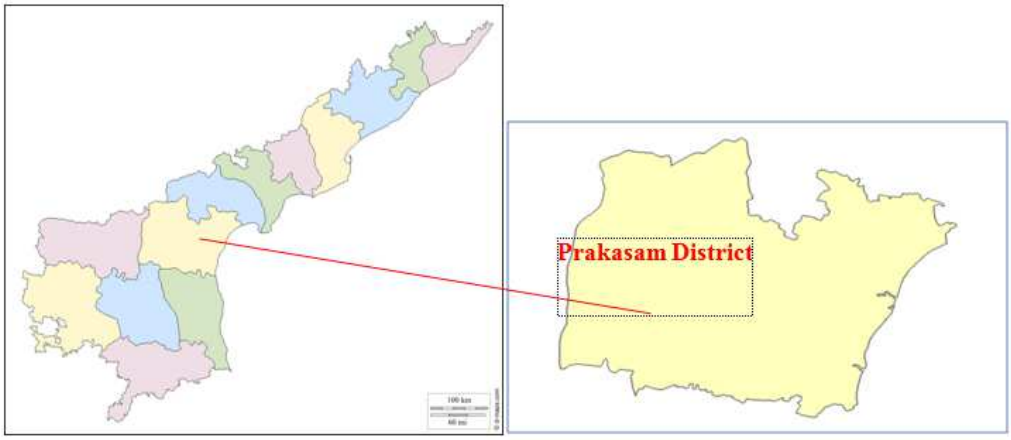

Figure 2.1: Location Map of the Study Area

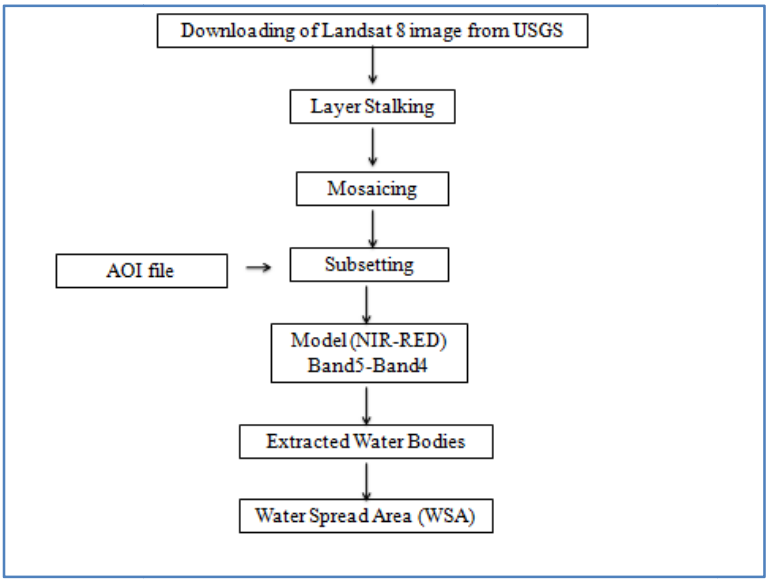

Figure 2.2: Overview of Methodology

The above figure 2.2 was the overall methodology for the extraction of the water bodies.

Data used for Study

US Geological Survey (USGS) Landsat-8 OLI images were employed. These images are in the World Geodetic

System (WGS 84) datum in GeoTIFF format and projected using the Universal Transverse Mercator system. Two OLI images from Landsat-8, which were acquired over the Prakasam district of Andhra Pradesh. The two OLI images were acquired on 21 Oct 2015 (path/row 143/49), 30 Oct 2015 (path/row 142/49). The study area containing several water bodies like ponds, lakes, tanks, dams and reservoir. The present extracted water bodies only surface storage. The extraction of surface water bodies from Landsat 8 and the data details is shown in table 1.

Table 1: List of Data used for Study Area

S. No	Path/row	Date of pass Satellite	Image ID
1.	143/49	21 Oct,2015	LC81430492015294LGN00 .tar
2.	142/49	30 Oct,2015	LC81420492015303LGN01.tar

Model for Water Bodies Extraction

The new model was developed for the extraction of bodies from the Landsat image, so the condition of the model which was tested for the Landsat image of path/row, which was 143/49 and 142/49 are to be tested in the model. The condition of the new model was Band 5-Band 4 (NIR-Red).

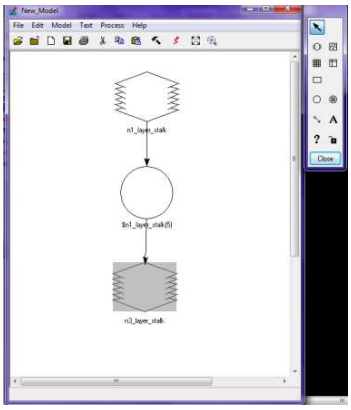

Figure 2.14: Model for Extraction of Water Bodies

RESULTS AND DISCUSSIONS

This chapter describes the results obtained from the analysis of spatial-temporal satellite derived water bodies information of Prakasam district, model framework for the extraction of surface water bodies from the Landsat 8 image of Prakasam district of Andhra Pradesh. The discussion is made from the satellite derived water body area with the help of figures. Water body layers derived from Landsat 8 sensor through the model for extraction of water body information for Prakasam district.. The analysis is focused on the surface water bodies.

Sub Setting of Study Area for Water Extraction

The area of interest was subset by using a study area shape file to clip the required area by discussing in the methodology section.

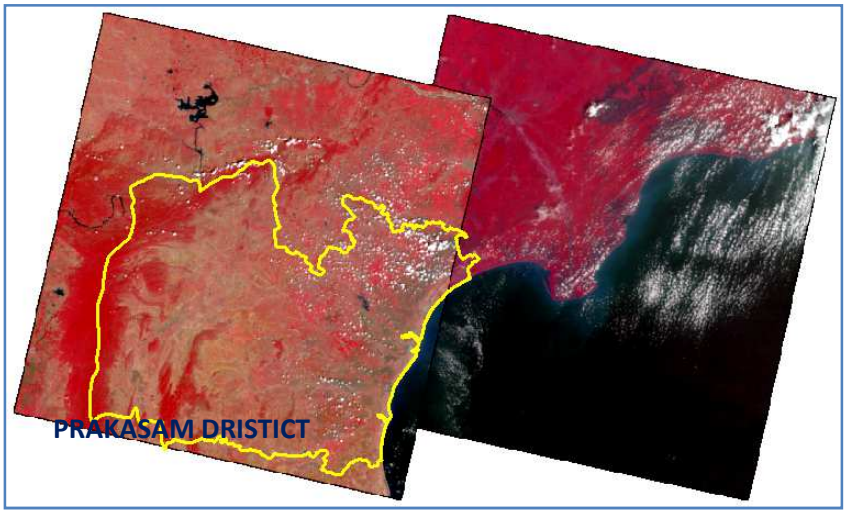

Figure 3.3: District Boundary Layer of Area of Interest

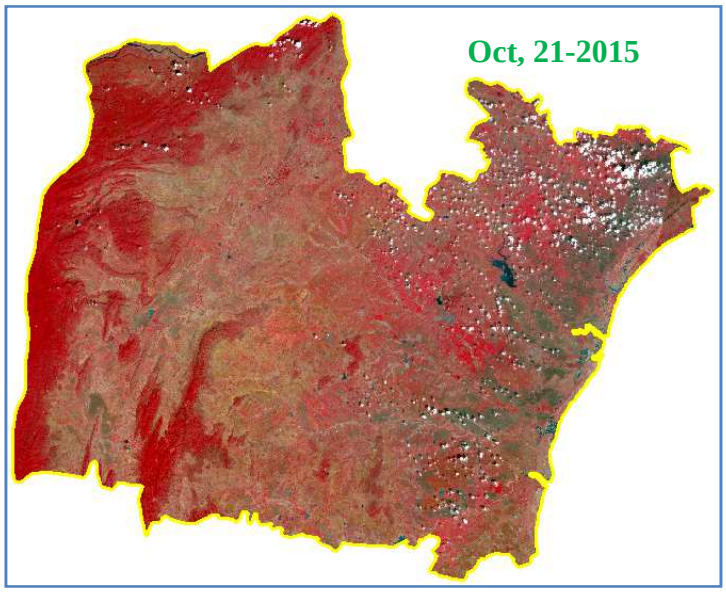

Figure 3.4: Subsetting of Area of Interest

Extraction of Water Bodies from Satellite Image

Extraction of water bodies from the Landsat image for using the model shown in methodology. The figure 3.5 shows that the extracted water bodies layer for the Prakasam district of Andhra Pradesh.

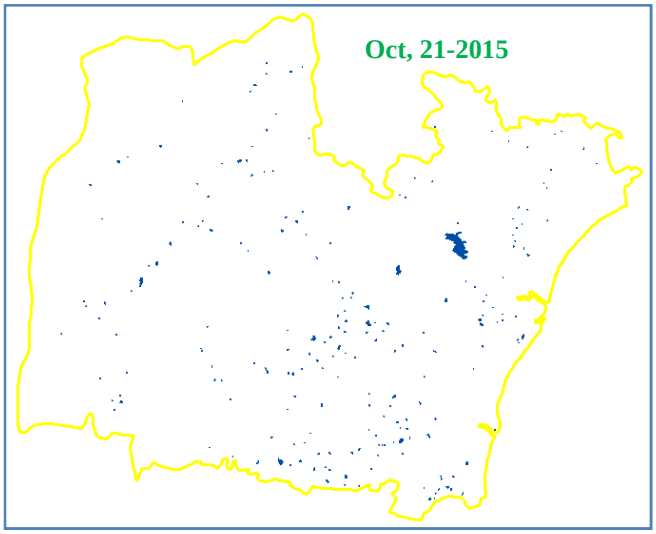

Figure 3.5: Extraction of Water Layer from Satellite Image

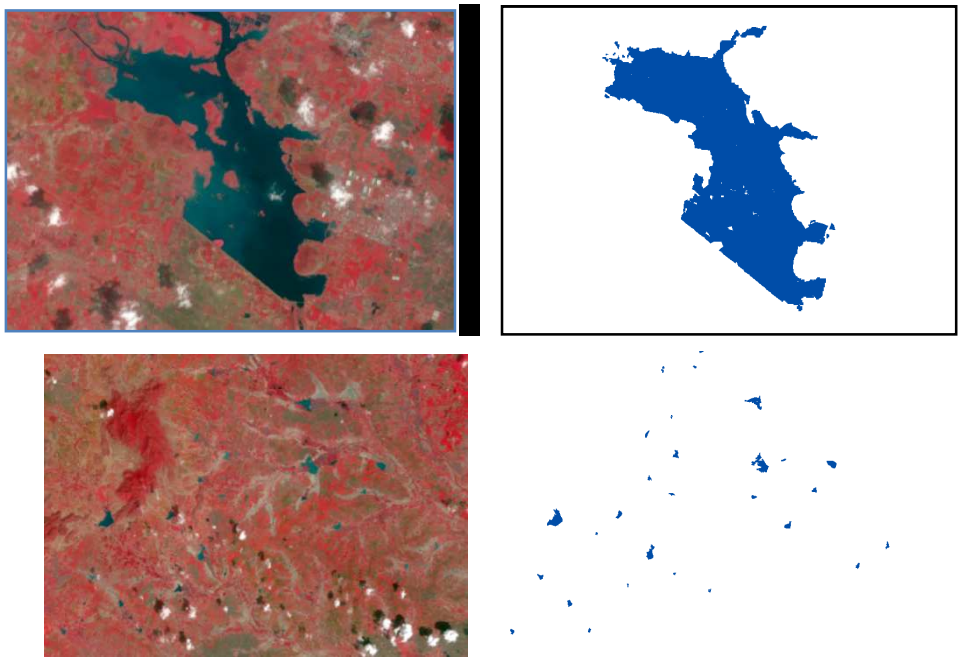

Figure 3.6: Extraction of Water Bodies Layers for Oct, 21-2015

The above figure 3.5 and 3.6 was shown that the water spread area of the individual water bodies. The total water spread area of the Prakasam by using the new model was 4178.48 ha. The model was extracted by pixel wise analysis has been done for the identification of water and non water bodies.

CONCLUSIONS

- The remote sensing and GIS application tools are very useful for the extraction of surface water body's information and analysis.
- The water spread area is analyzed in October month 2015. Satellite derived total WBA, number of water bodies categories by size as observed from satellite data and aggregated WBA in each category in the months of October.
- The total water spread area of Prakasam is 4178.48ha.

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